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Entertainment and data management system for passenger vehicle including individual seat interactive video terminals.

An interactive video terminal (14) comprises a video display screen (22) and a transparent touch panel (24) overlying the screen (22) and having a plurality of pressure sensitive areas for generating discrete electrical selection signals respectively when touched. Further are provided computing means (30) for generating visual prompts corresponding to predetermined selectable operations of the terminal (14) for display on the screen (22) underlying predetermined pressure sensitive areas of the panel (24) respectively. Control means (28) are provided, which control means (28) are responsive to said selection signals from the panel (24) for controlling the terminal (14) to perform said operations corresponding thereto respectively.

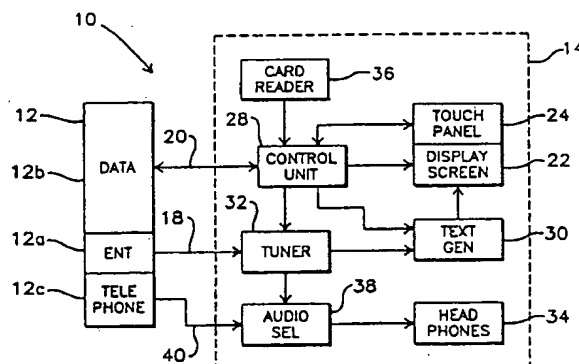


Fig.1

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requests verbally. Ordering of catalog items, payments by credit card and placing of telephone calls are entirely free of flight attendant participation.

These and other features and advantages of the present invention will be apparent to those skilled in the art from the following detailed description, taken together with the accompanying drawings, in which like reference numerals refer to like parts.

## DESCRIPTION OF THE DRAWINGS

FIG. 1 is a simplified block diagram of a first embodiment of an interactive video entertainment and data management system of the present invention including individual interactive seat video terminals;

FIG. 2 is a front elevational view of a terminal of the system of FIG. 1;

FIG. 3 is a simplified side elevational view illustrating an exemplary layout of components in the terminal of FIG. 2;

FIG. 4 is a diagram illustrating the layout of a touch panel of the terminal of FIG. 2;

FIG. 5 is a more detailed block diagram of the system of FIG. 1;

FIG. 6 is a perspective view of a terminal of a second embodiment of an interactive video entertainment and data management system of the present invention; and

FIG. 7 is a block diagram of the system of FIG. 6.

## DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGs. 1 to 3 of the drawing, an interactive video entertainment and data management system for a passenger vehicle such as an aircraft is generally designated as 10, and includes a central terminal 12 and a plurality of remote video terminals 14. Although only one terminal 14 is illustrated, a plurality of terminals 14 are provided in the system 10, with one terminal 14 being mounted forward of each passenger seat. As shown in FIG. 2, the illustrated terminal 14 includes a housing 15 mounted in a seatback 16 so as to be comfortably viewable by a passenger in the seat immediately behind the seatback 16. For front row seats, the terminal 14 is mounted in a bulkhead forward of the seat.

The central terminal 12 includes an entertainment section 12a for generating a multiplexed video/audio signal including a plurality of movie channels. Although not specifically illustrated, the section 12a typically includes a plurality of VTRs for playing different movies respectively and a multiplexer for multiplexing the channels and feeding the resulting signal to the terminals 14 via a line

18. The central terminal 12 also includes a data section 12b for polling the terminals 14 for data, and receiving the data therefrom over a line 20. The central terminal 12 may further include a radiotelephone transceiver unit 12c for enabling passengers to place overseas telephone calls from the aircraft.

The details of the central terminal 12 and lines 18 and 20 per se are not the particular subject matter of the present invention. A central terminal and interconnecting lines suitable for practicing the invention are commercially available from Hughes-Avicom International (HAI) of Glendora, CA. Although not illustrated in detail, the data section 12b generally includes a mainframe class computer capable of multi-user, multi-tasking operation and downloading of data received from the terminals 14 to an external facility for processing. The data section 12b communicates with the terminals 14 using a local area network (LAN) such as the Ampro "Arcnet" system. In this case, the line 20 is constituted by a twisted conductor pair, and the individual seat terminals 14 are sequentially polled for data from the central terminal 12 using a "token ring" communications protocol.

Each remote terminal 14 includes a video display screen 22 such as a flat liquid crystal display (LCD) panel. A commercially available display screen 22 suitable for application in the present system 10 is the Sharp TFT-LCD module no. LQ4NC01. A transparent touch panel 24 is mounted closely adjacent to and overlying the screen 22 as illustrated in FIG. 3.

The touch panel 24 has a plurality of touch sensitive areas which produce discrete electrical selection signals when touched. A suitable touch panel 24 which is commercially available from Transparent Devices, Inc. of Westlake Village, CA has, as illustrated in FIG. 4, 16 touch sensitive areas arranged in rows R1 to R4 and columns C1 to C4. Each touch sensitive area is designated by a row and column coordinate.

As illustrated in FIG. 1, each terminal 14 includes an electronic control unit 28 which controls a text generator 30 to generate and display the visual prompts on the screen 22. It will be noted that the text generator 30 may be replaced within the scope of the invention by a character generator which generates visual prompts in the form of icons or the like, although not specifically illustrated. A commercially available text generator 30 suitable for use in the system 10 is the Fujitsu Display Controller LSI no. MB88324A.

The multiplexed video/audio movie channel signal is received over the line 18 by a tuner 32, which tunes to a selected channel, feeds the channel video signal to the screen 22 via the text generator 30 and feeds the channel audio signal to

An outgoing telephone call can be placed by touching column C3 or C4 in row R3. Lower level menus including prompts for the telephone number and payment method will be progressively displayed, in addition to prompts indicating the status of the call. The headphones 34 include a microphone as well as speakers to enable telephone communications. Each terminal 14 further includes an audio selector 38 which is controlled by the control unit 28 to connect the headphones 34 to the telephone unit 12c through a telephone cable 40 when the telephone function is selected.

The terminal 14 is illustrated in more detail in FIG. 5, and includes a digital processor 42 which is preferably embodied by the Dallas DS5000 Soft Microcontroller described above. The processor 42 communicates with the data section 12b of the central terminal 12 over the line 20 via an Arcnet LAN interface unit 44. The terminals 14 are operated as slave units and are sequentially polled from the central terminal 12 using the Arcnet token ring protocol.

Although not specifically illustrated, the menu system also enables selection of "BRIGHTNESS", "CONTRAST", "COLOR", "VOLUME" and "HEADSET BALANCE" prompts for adjustment of the corresponding display and sound attributes. When one of these prompts is displayed, touching an up or down arrow prompt displayed on the screen 22 causes the displayed attribute to be varied in the respective direction. The display tint can be adjusted in a similar manner.

Although not shown in detail, the touch panel 24 includes four enable lines and four read lines which are connected to the processor 42 through buffers 56 and 58 respectively. The processor 42 controls the tuner 32 via a serial I<sup>2</sup>C bus 60, and is interfaced to the bus 60 by an I<sup>2</sup>C interface 62 such as the Philips I<sup>2</sup>C-Bus Controller no. PCD8584. The processor 42 also controls the brightness, contrast, color and tint of the display on the screen 22 over the I<sup>2</sup>C bus 60 via digital-to-analog converters (DACs) 64, 66, 68 and 70 respectively. Eight of these DACs are commercially available in a single package as the Philips Octuple 6-bit DAC with I<sup>2</sup>C bus no. TDA8444. The card reader 36 is connected to the processor 42 by a buffer 71.

The terminal 14 further includes a synchronization separator 72 which is preferably embodied by the National Semiconductor Video Sync Separator no. LM1881. The tuner 32 has a synchronization signal output which is connected to the separator 72. Then a video signal is output from the tuner 32, the separator 72 generates and feeds vertical and horizontal synchronization (sync) pulses to the text generator 30 for superposition of text prompts on a movie, and feeds vertical sync pulses to the pro-

cessor 42.

The presence of vertical sync pulses indicates to the processor 42 that a video signal is present. In response, the processor 42 controls the text generator 30 to utilize the sync signals from the separator 72. When a video signal is not present, such as while text prompts are being displayed on the screen 22 for ordering food, drinks, etc., the processor 42 does not receive vertical sync pulses from the separator 72, and controls the text generator 30 to generate sync pulses internally for display of the text prompts.

The terminal 14 may provide additional functions such as displaying a video game which can be played using a remote module such as the Nintendo Super NES (not shown). A connector 74 is illustrated in FIG. 2 which enables the game module to be connected to the terminal 14 by a modular telephone cable or the like. The terminal 14 may also display movie previews, weather maps, flight status, connecting flight and other information generated by the central terminal 12.

The terminal 14 also preferably includes an auxiliary processor 73 as embodied by the Ampro CoreModule xt Processor Board. The processor 73 provides an intelligent interface between the interface unit 44 and the processor 42, and includes 256K bytes of non-volatile memory for the storage of system programs, credit card sales information and other data.

The processor 73 also enables video display of weather maps, airport diagrams and other computer-generated color graphics images. A color graphics adaptor (CGA) interface unit 74 as embodied by the Ampro MiniModule CGA Board converts data from the processor 73 into CGA composite video. A multiplexer 75 is controlled by the processor 42 to select either the video from the text generator 30 or the CGA video from the interface 74 for display on the screen 22.

Passenger aircraft often have first class sections which provide enhanced services above those of coach, business class, etc. In such an aircraft, the terminals 14 may be provided in the lower class sections, and terminals 80 illustrated in FIGs. 6 and 7 provided in the first class section. Each terminal 80 includes a fixed housing 82 which is detachably mounted in an armrest console 84 of a first-class passenger seat. A personal VTR player 86 is provided in the fixed housing 82 for playing of a movie recorded on a video cassette tape 88 from a library available on the aircraft. It will be understood that a player which reproduces entertainment recorded on other video storage media such as video discs, may be substituted for the VTR player within the scope of the invention.

A movable housing 90 is supported at the end of a pivotable swing arm 92, and is movable from a

2. The terminal of claim 1, characterized in that :  
the computing means (30) comprises means (30) for generating said prompts in the form of a multi-level menu structure;  
the control means (28, 94) comprises means (75) for controlling the terminal (14, 80) to perform said operations in response to a combination of a selected menu level and said selection signals respectively.
3. The terminal of claim 1 or claim 2, characterized by tuner means (32) for receiving a multiplexed video signal including a plurality of video channels and tuning to a selected channel for display on the screen (22), whereby  
the computing means (30) comprises means (30) for generating predetermined prompts corresponding to said channels for display on the screen underlying predetermined pressure sensitive areas (R/C) of the panel (24) respectively; and  
the control means (28, 94) comprises means (75) for controlling the terminal to terminate display of said prompts and display said selected channel from the tuner means (32) on the screen (22) in response to a selection signal generated by the panel (24) corresponding to said selected channel.
4. The terminal of any of claims 1 - 3, characterized by video player means (86) for generating video program signals corresponding to a program recorded on a video storage medium (88) for display on the screen (22), whereby  
the computing means (30) further comprises means for generating predetermined prompts corresponding to selectable operations of the video player means (86) for display on the screen (22) underlying predetermined pressure sensitive areas (R/C) of the panel (24) respectively; and  
the control means (28, 94) controls the video player means (86) to perform said operations in response to said selection signals corresponding thereto respectively.
5. The terminal of claims 3 and 4, characterized in that:  
the computing means (30) further comprises means for generating predetermined prompts corresponding to the tuner means (32) and the video player means (86) for display on the screen (22) underlying predetermined pressure sensitive areas (R/C) of the panel (24) respectively; and  
the control means (28, 94) comprises means (75, 114) for controlling the terminal (22) to display a selected channel from the tuner means (32) or the program signals from the video player means (86) in response to said selection signals corresponding thereto respectively.
6. The terminal of any of claims 1 - 5, characterized by communication means (44) for transmitting data signals external of the terminal (14, 80), whereby  
the computing means (30) comprises:  
prompt generating means (30) for generating predetermined prompts corresponding to selectable data signals for external transmission for display on the screen (22) underlying predetermined pressure sensitive areas (R/C) of the panel (24); and  
data generating means (42, 95) for generating said data signals; and  
the control means (28, 94) comprises means (73) for controlling the communication means (44) to transmit said data signals in response to said selection signals corresponding thereto respectively.
7. The terminal of claim 6, characterized in that:  
the prompt generating means (30) comprises means (30) for generating said prompts as corresponding to items which can be selectively requested; and  
the data generating means (42, 95) comprises means for generating said data signals as corresponding to said requested items.
8. The terminal of claim 7, characterized by card reader means (36) for reading card data from a card inserted therein for payment for said requested items, whereby  
the prompt generating means (30) comprises means for generating a prompt instructing insertion of the card into the card reader means (36); and  
the communication means (44) comprises means for transmitting said card data together with said data signals corresponding to said requested items.
9. The terminal of any of claims 1 - 8, characterized by telephone transceiver means (38), whereby  
the computing means (30) further comprises means for generating predetermined prompts corresponding to selectable operations of the telephone transceiver means (38) for display on the screen (22) underlying predetermined pressure sensitive areas (R/C) of the panel (24); and  
the control means (28, 94) comprises means for controlling the telephone transceiver

the first processor means (95) comprises means for receiving said card data read from the card reader means (36) in response to insertion of the card therein.

18. An interactive data management system (10) for a vehicle having a plurality of seats, comprising:

a plurality of remote video terminals (14, 80) mounted adjacent to respective seats, each video terminal (14, 80) including:

a video display screen (22);

a transparent touch panel (24) overlying the screen (22) and having a plurality of pressure sensitive areas (R/C) for generating discrete electrical selection signals respectively when touched;

communication means (44) for transmitting data signals external of the terminal (14, 80);

computing means (30) including prompt generating means for generating predetermined visual prompts corresponding to said data signals for display on the screen (22) underlying predetermined pressure sensitive areas (R/C) of the panel (24) and data generating means (42, 95) for generating said data signals respectively; and

control means (28, 94) responsive to said selection signals from the panel (24) for controlling the communication means (44) to transmit said data signals corresponding thereto respectively; and

central terminal means (12) including:

communication means (12b) for receiving said data signals from the terminals; and

processing means for performing operations corresponding to said received data signals.

19. The system of claim 18, characterized in that:

each prompt generating means (30) comprises means for generating said prompts as corresponding to items which can be selectively requested; and

each data generating means (42, 95) comprises means for generating said data signals as corresponding to said requested items.

20. The system of claim 19, characterized in that:

each video terminal (14, 80) further comprising card reader means (36) for reading card data from a card inserted therein for payment for said requested items;

each prompt generating means (30) comprises means for generating a prompt instructing insertion of the card into the card reader means (36); and

each communication means (44) com-

prises means for transmitting said card data together with said data signals corresponding to said requested items respectively to the central terminal means (12).

21. The system of any of claims 18 - 20, characterized in that:

the central terminal means (12) further includes means (12a) for generating a multiplexed video signal including a plurality of video channels;

each video terminal (14, 80) includes tuner means (32) for receiving the multiplexed video signal and tuning to a selected channel for display on the screen (22);

each prompt generating means (30) comprises means for generating predetermined prompts corresponding to said channels for display on the screen (22) underlying predetermined pressure sensitive areas (R/C) of the panel (24) respectively; and

the control means (28, 94) comprises means for controlling the terminal (14, 80) to terminate display of said prompts and display said selected channel from the tuner means (32) on the screen (22) in response to a selection signal generated by the panel (24) corresponding to said selected channel.

22. The system of any of claims 18 - 21, characterized in that:

each video terminal (14, 80) further comprises video player means (86) for generating video program signals corresponding to a program recorded on a video storage medium (88) for display on the screen (22), whereby

each computing means (30) further comprises means for generating predetermined prompts corresponding to selectable operations of the video player means (86) for display on the screen (22) underlying predetermined pressure sensitive areas (R/C) of the panel (24) respectively; and

each control means (28, 94) controls the video player means (86) to perform said operations in response to said selection signals corresponding thereto respectively.

23. The system of claim 22, characterized in that:

each computing means (30) further comprises means for generating predetermined prompts corresponding to the tuner means (32) and the video player means (86) for display on the screen (22) underlying predetermined pressure sensitive areas (R/C) of the panel (24) respectively; and

each control means (28, 94) comprises means (114) for controlling the terminal to dis-

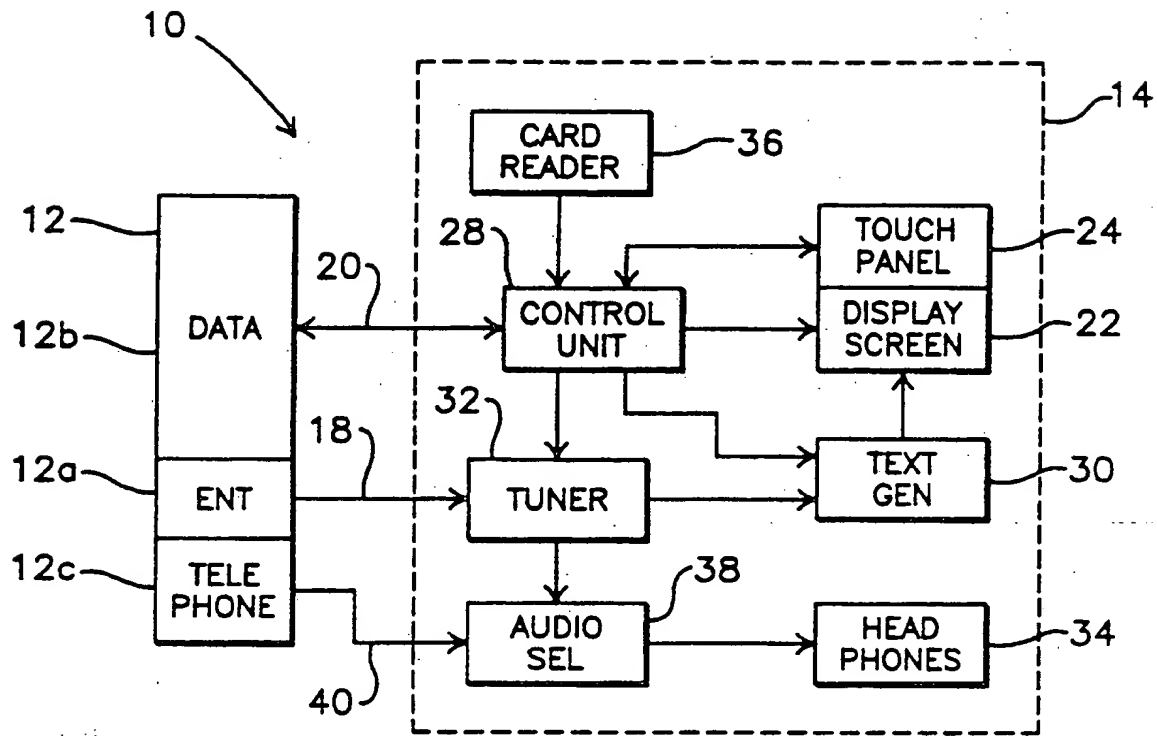


Fig.1

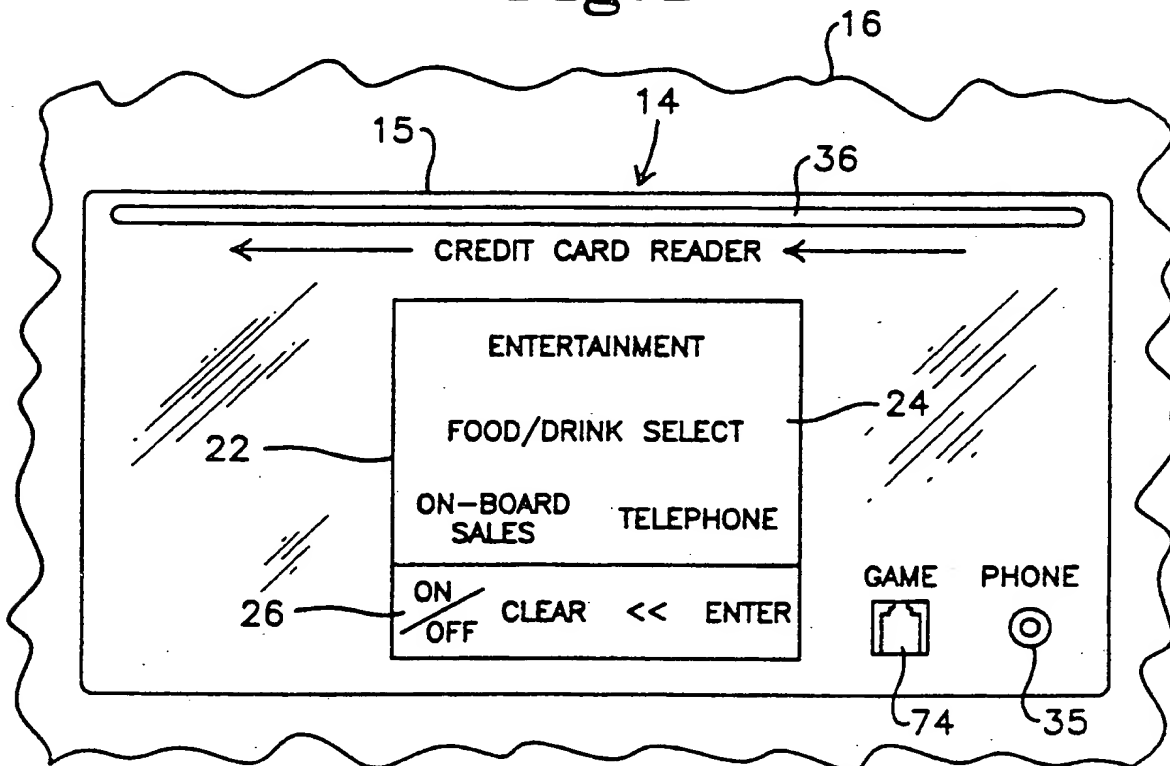
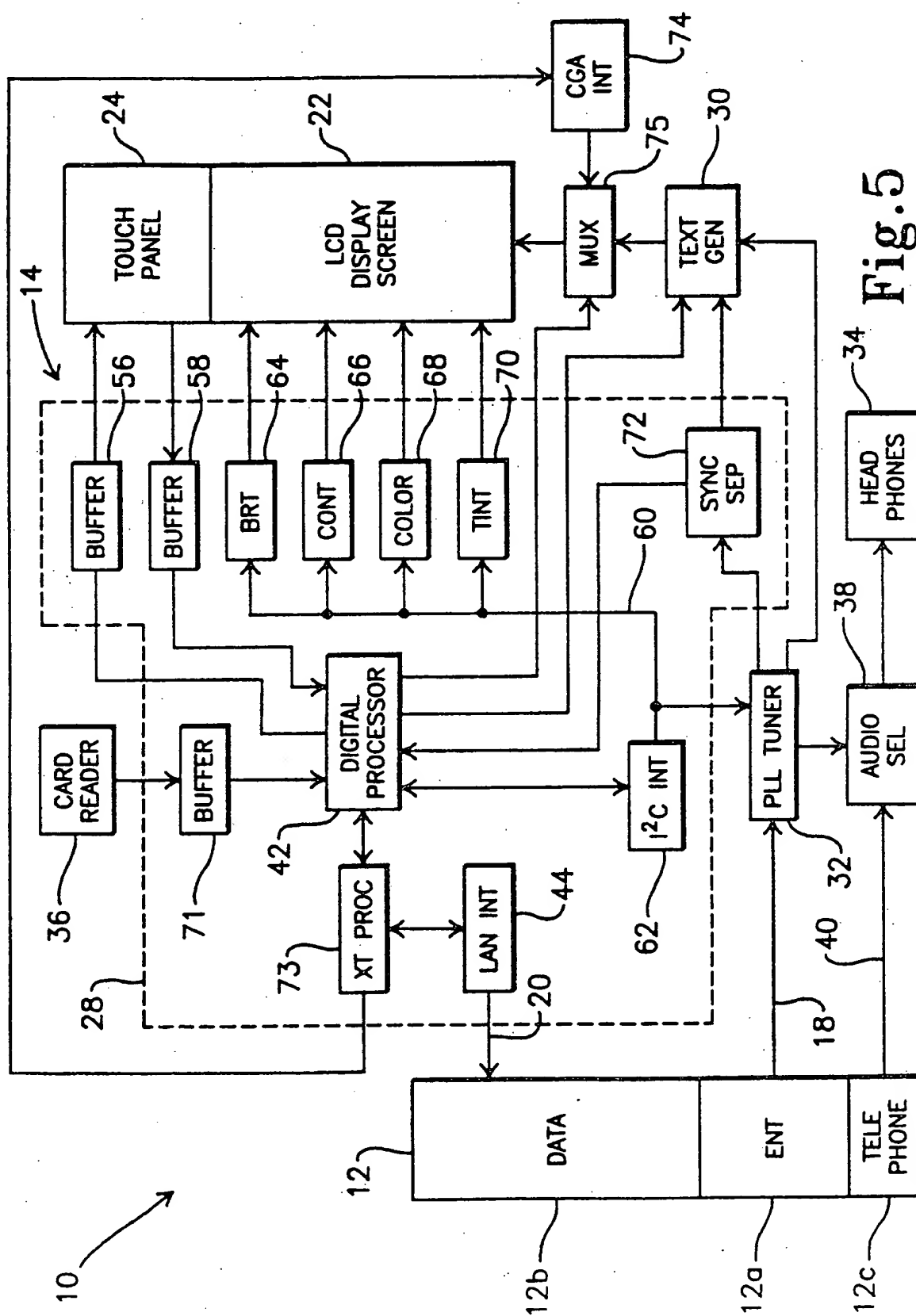


Fig.2



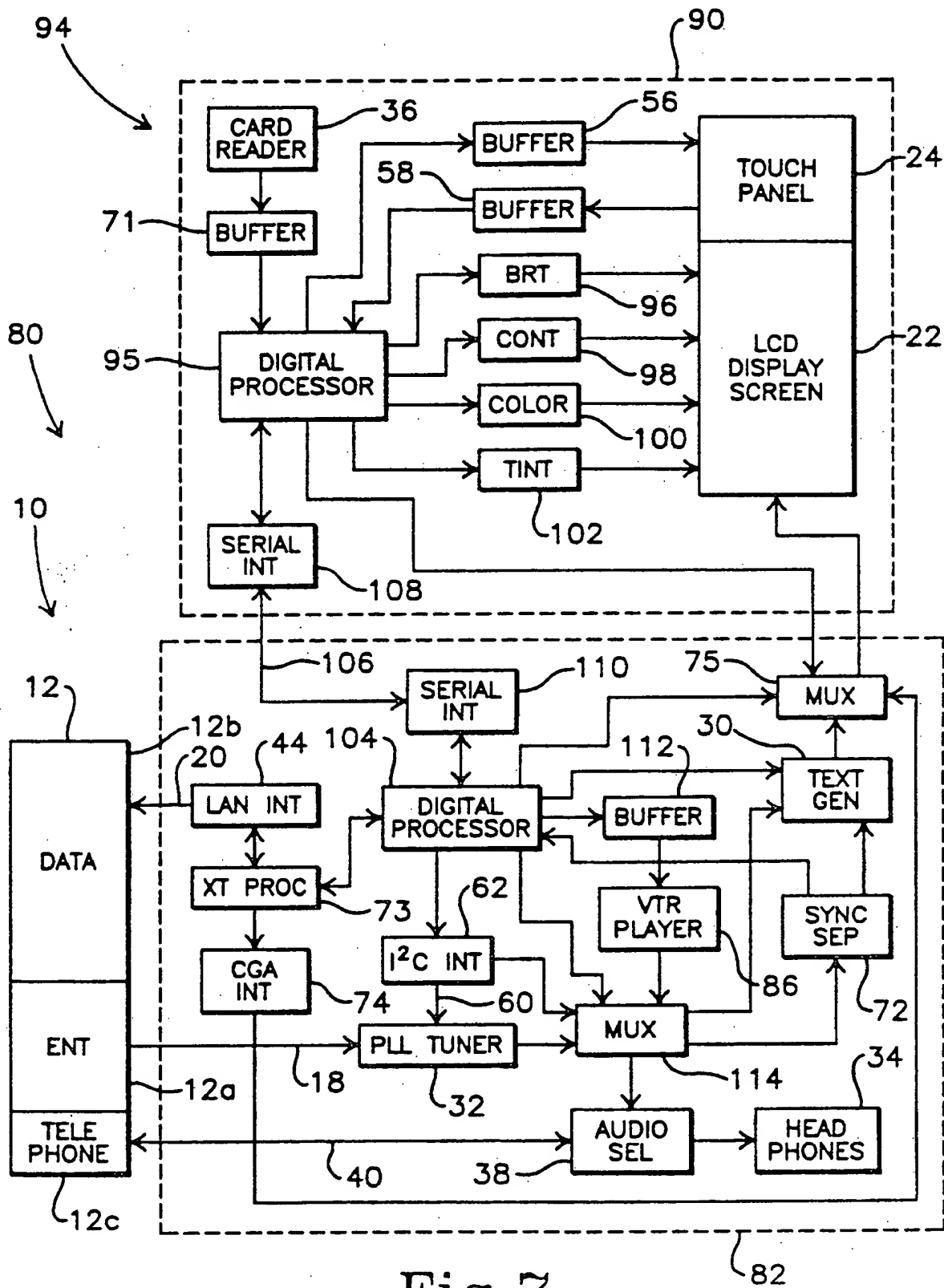


Fig. 7